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(54) **MARKER TAG DARTS, DART GUNS THEREFOR, AND METHODS**

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(52) **U.S. Cl.**

USPC **446/473**; 124/56; 124/59; 124/69; 124/71; 124/73; 222/79; 473/581

(58) **Field of Classification Search**

USPC 473/581; 124/56, 59, 69, 71, 73; 446/473; 222/79

See application file for complete search history.

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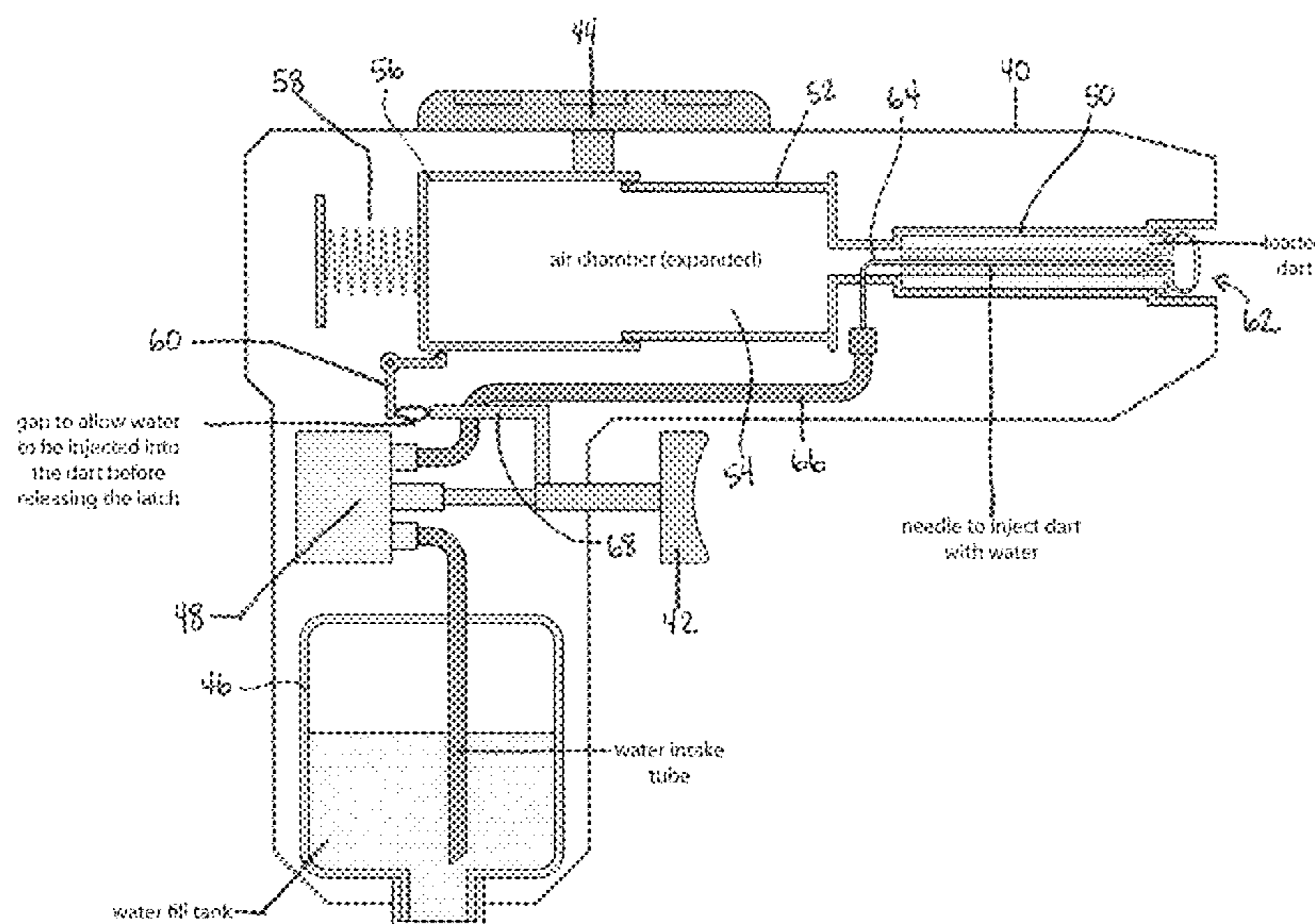
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(57) **ABSTRACT**

Marker tag darts, dart guns therefor, and methods which allow a toy gun to receive a marker tag dart, to put water in the forward tip of the dart and to shoot the dart. The marker tag dart itself has slits in the wall of a small chamber at the front of the dart so that on impact with a target, the inertia of the water causes deformation of the tip and opening of the slits to eject water for marking the location of the marker tag dart hit. The dart guns are spring chocked, and propel the dart with a blast of air from an air pump powered by the spring. Various embodiments and modes of operation are disclosed.

7 Claims, 7 Drawing Sheets



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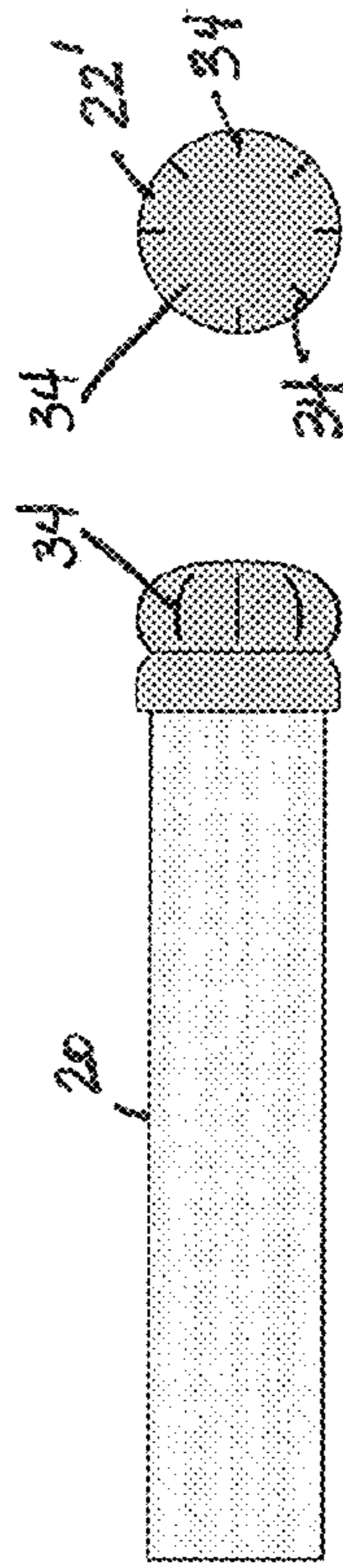


Fig. 1a

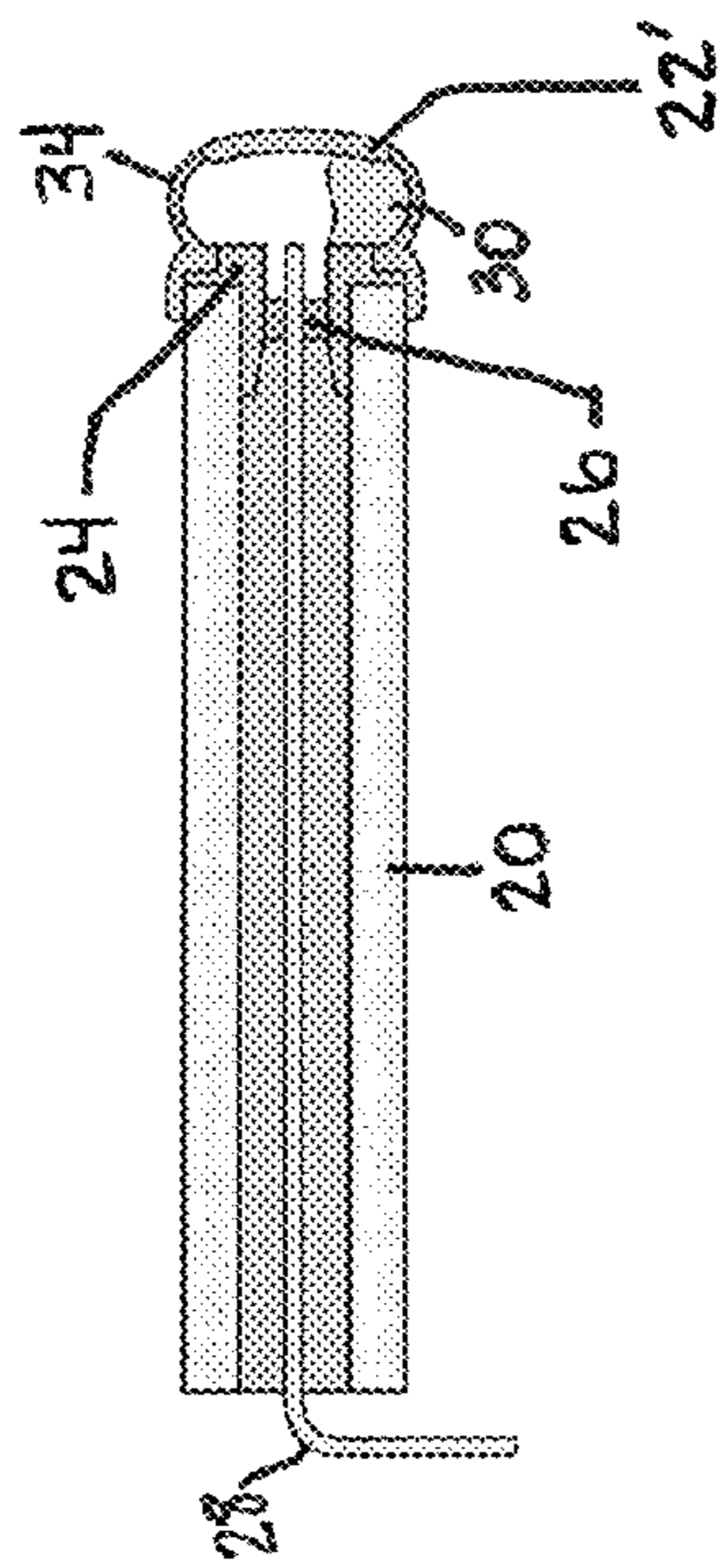


Fig. 1b

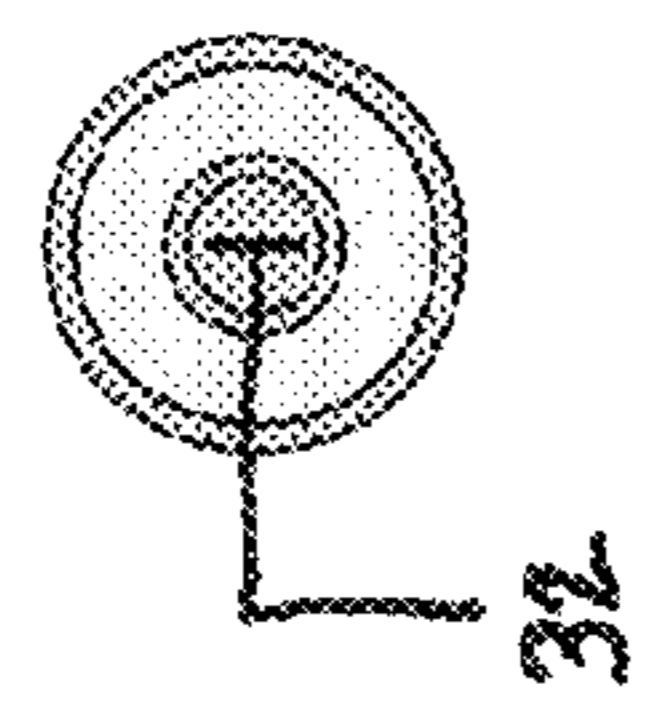


Fig. 1c

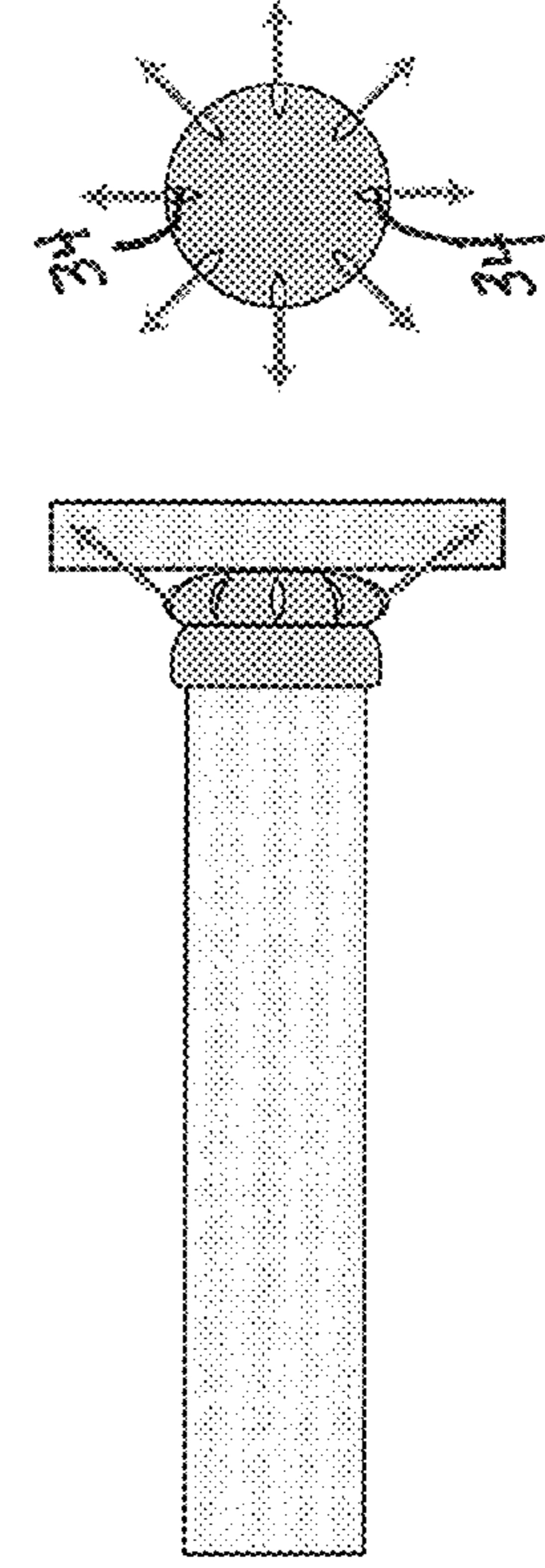


Fig. 2a

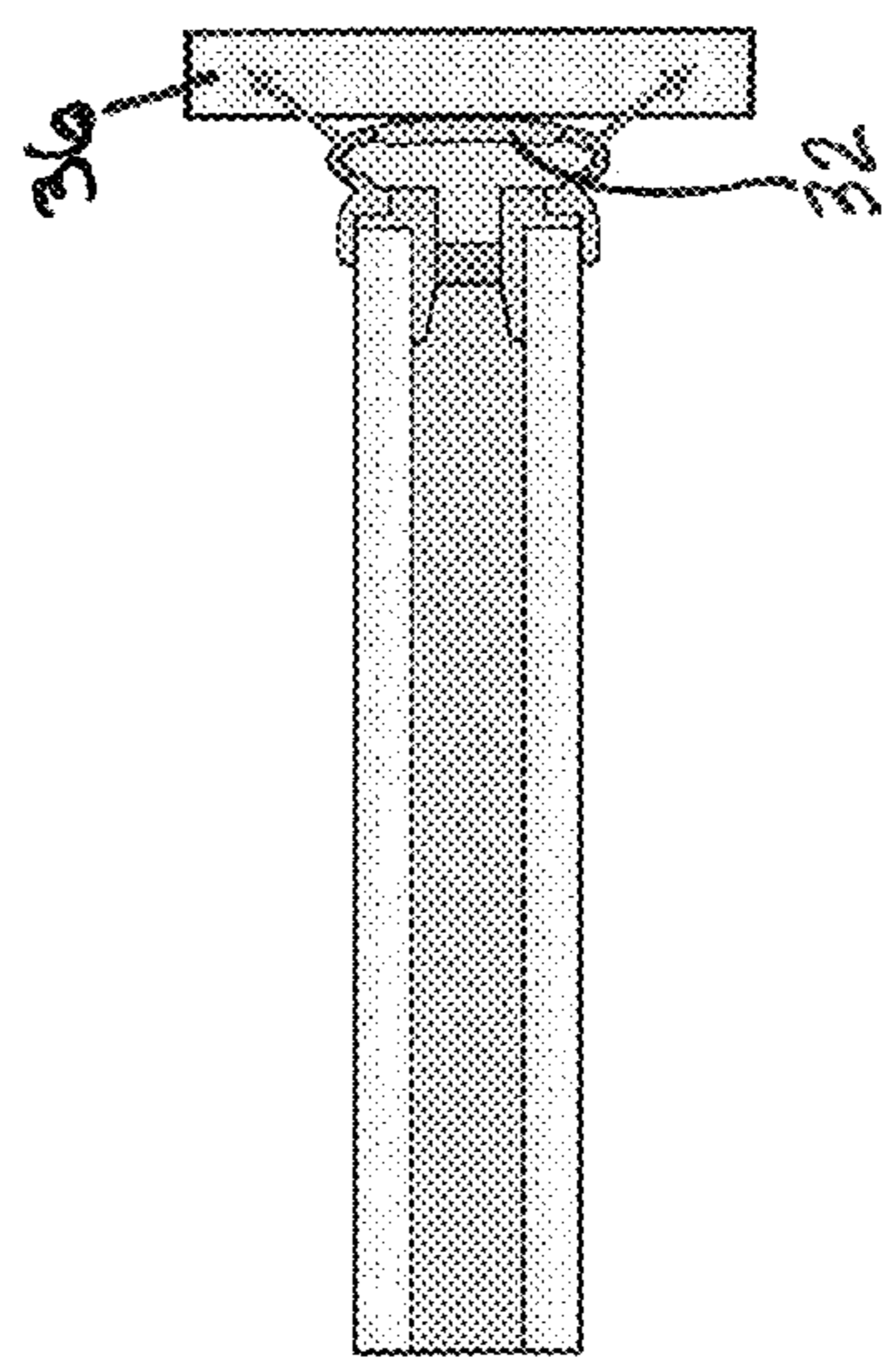


Fig. 2b

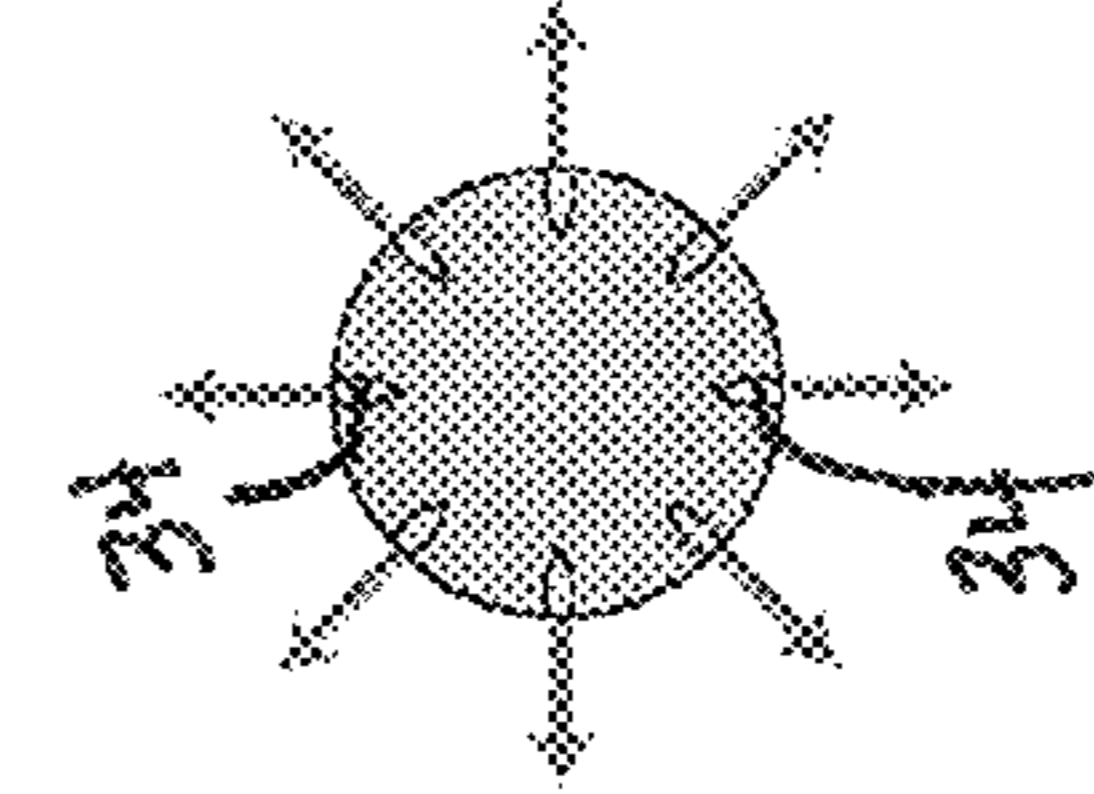


Fig. 2c

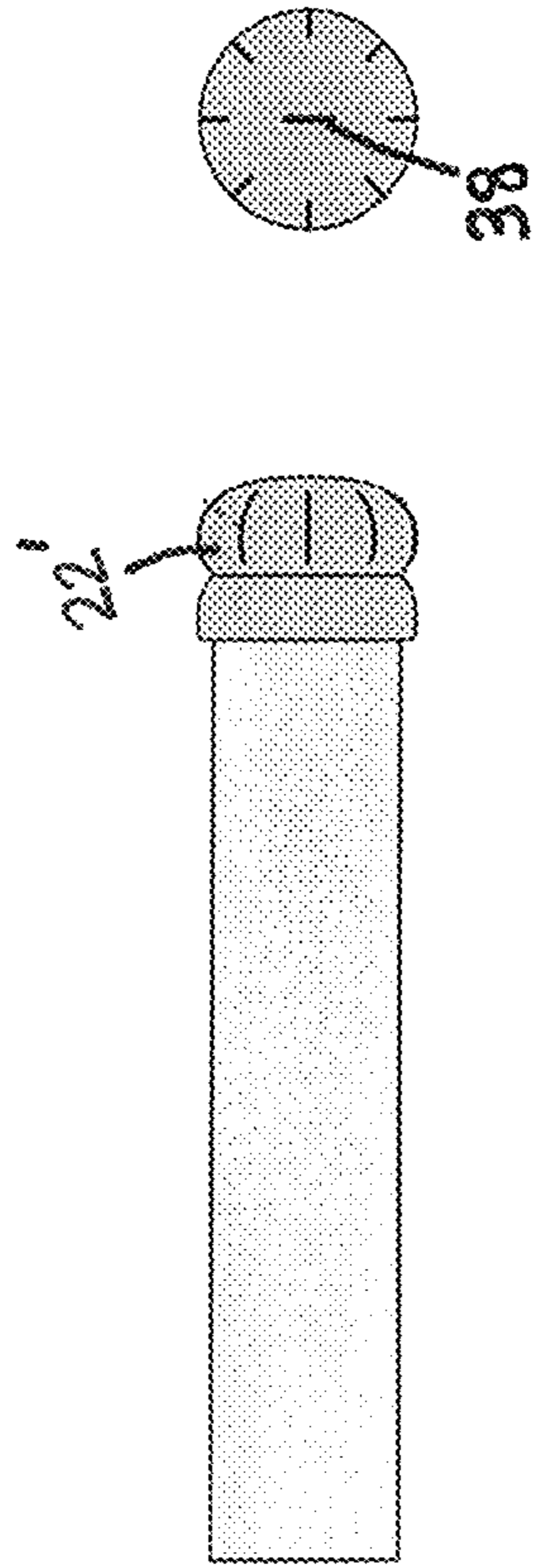


Fig. 3a

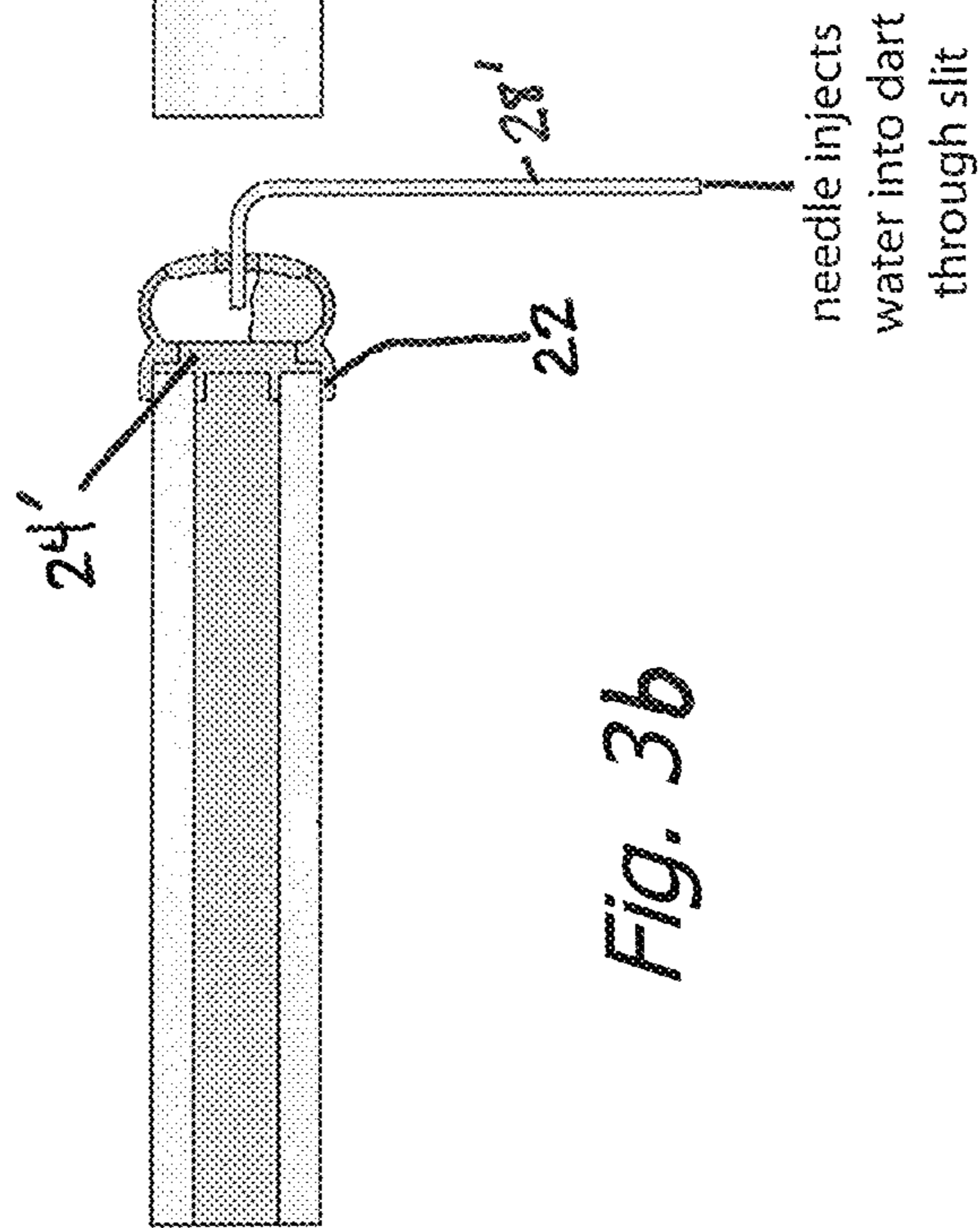


Fig. 3b

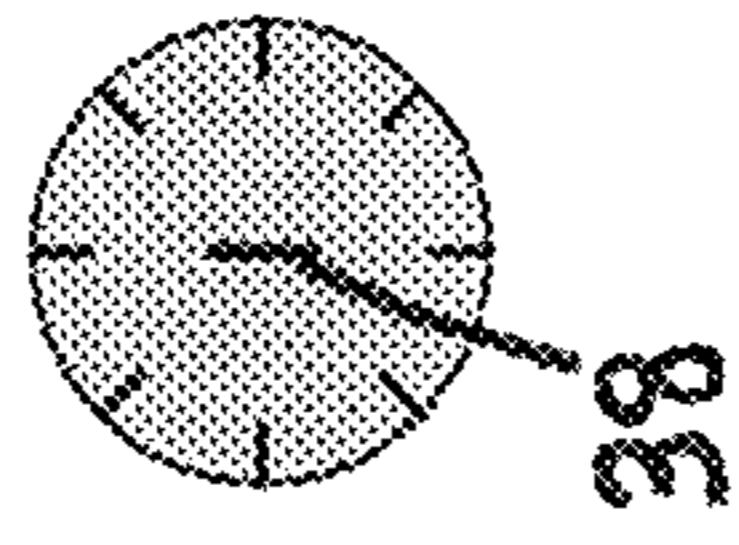


Fig. 3c

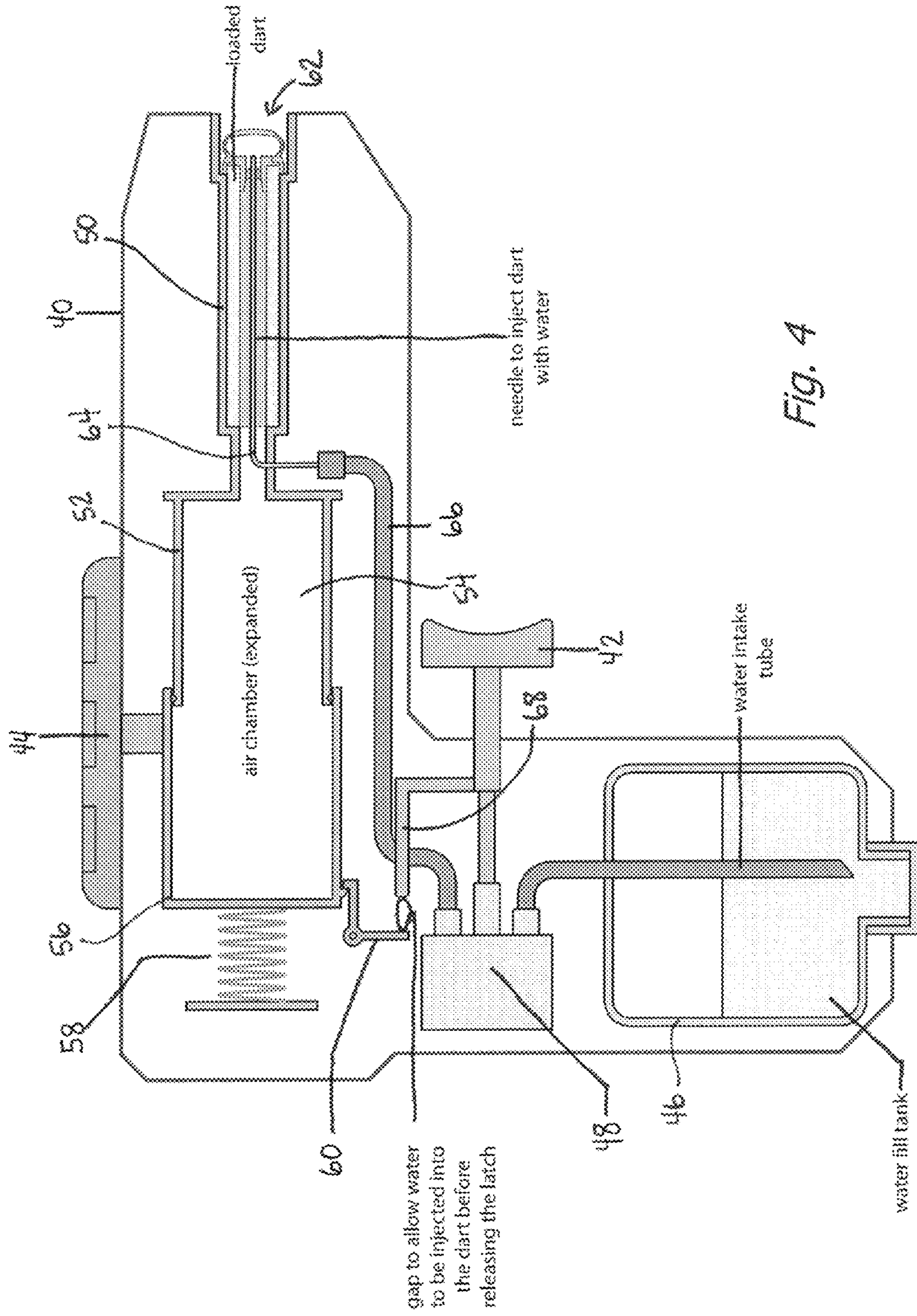


Fig. 4

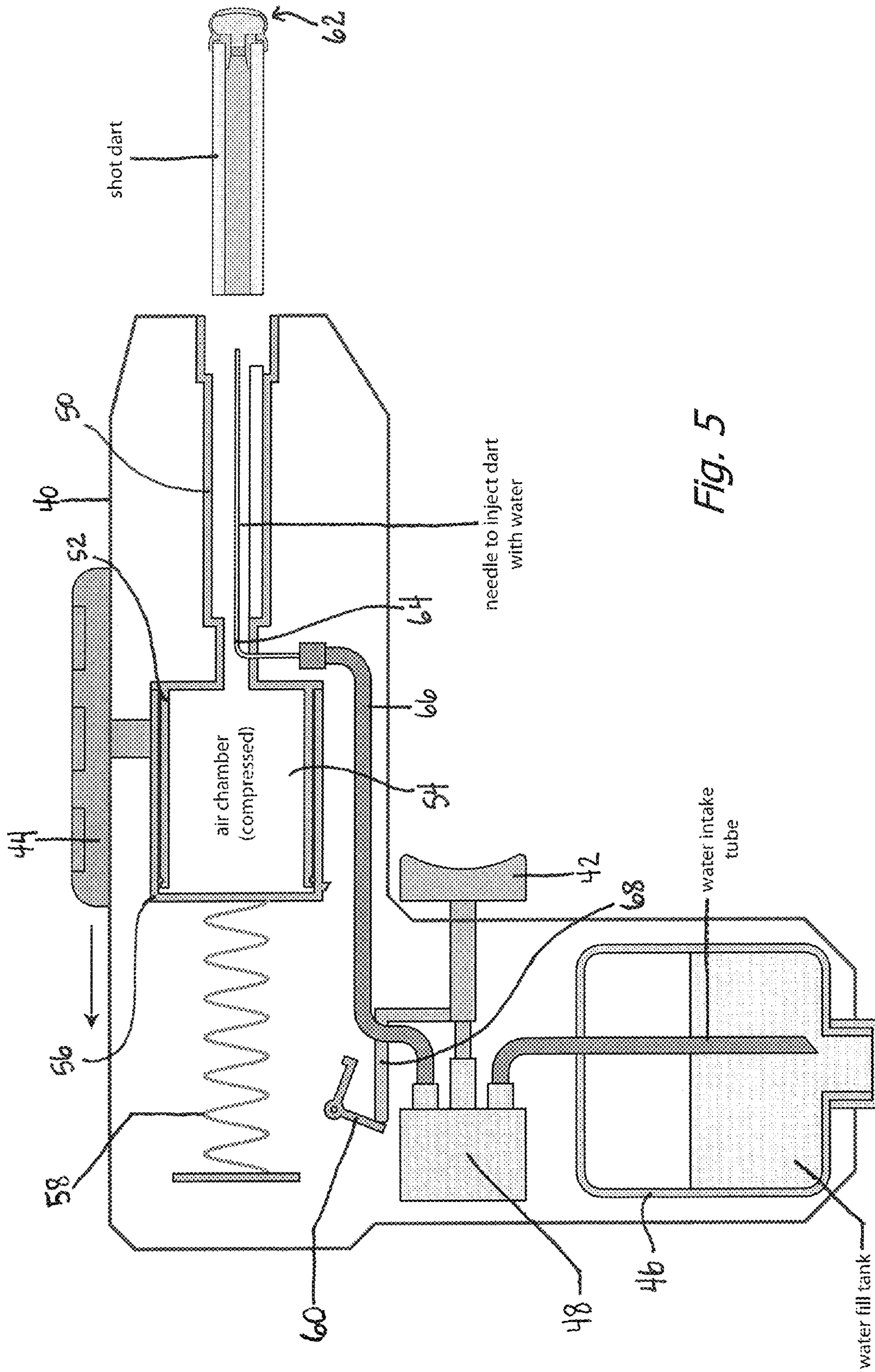


Fig. 5

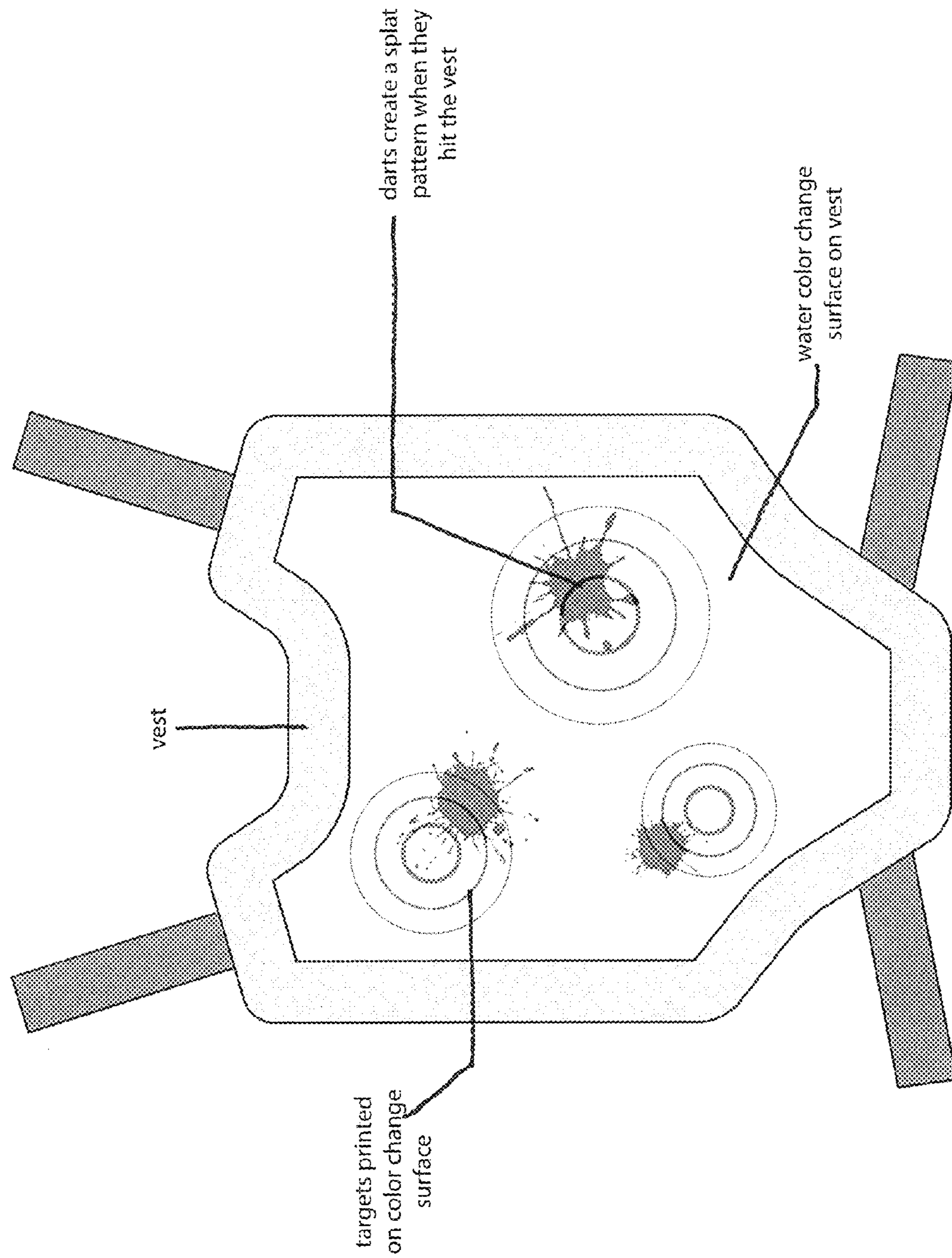


Fig. 6

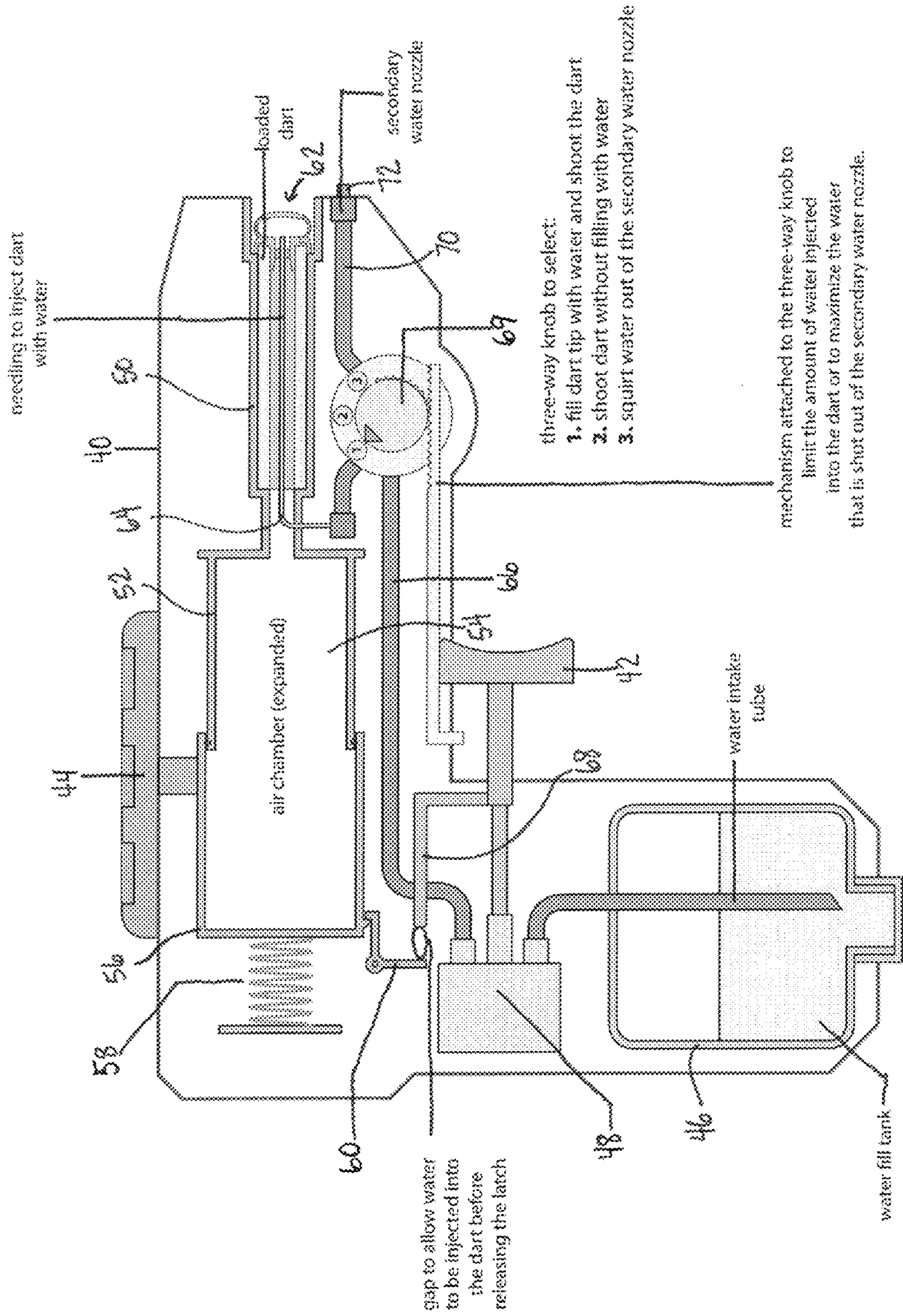


Fig. 7

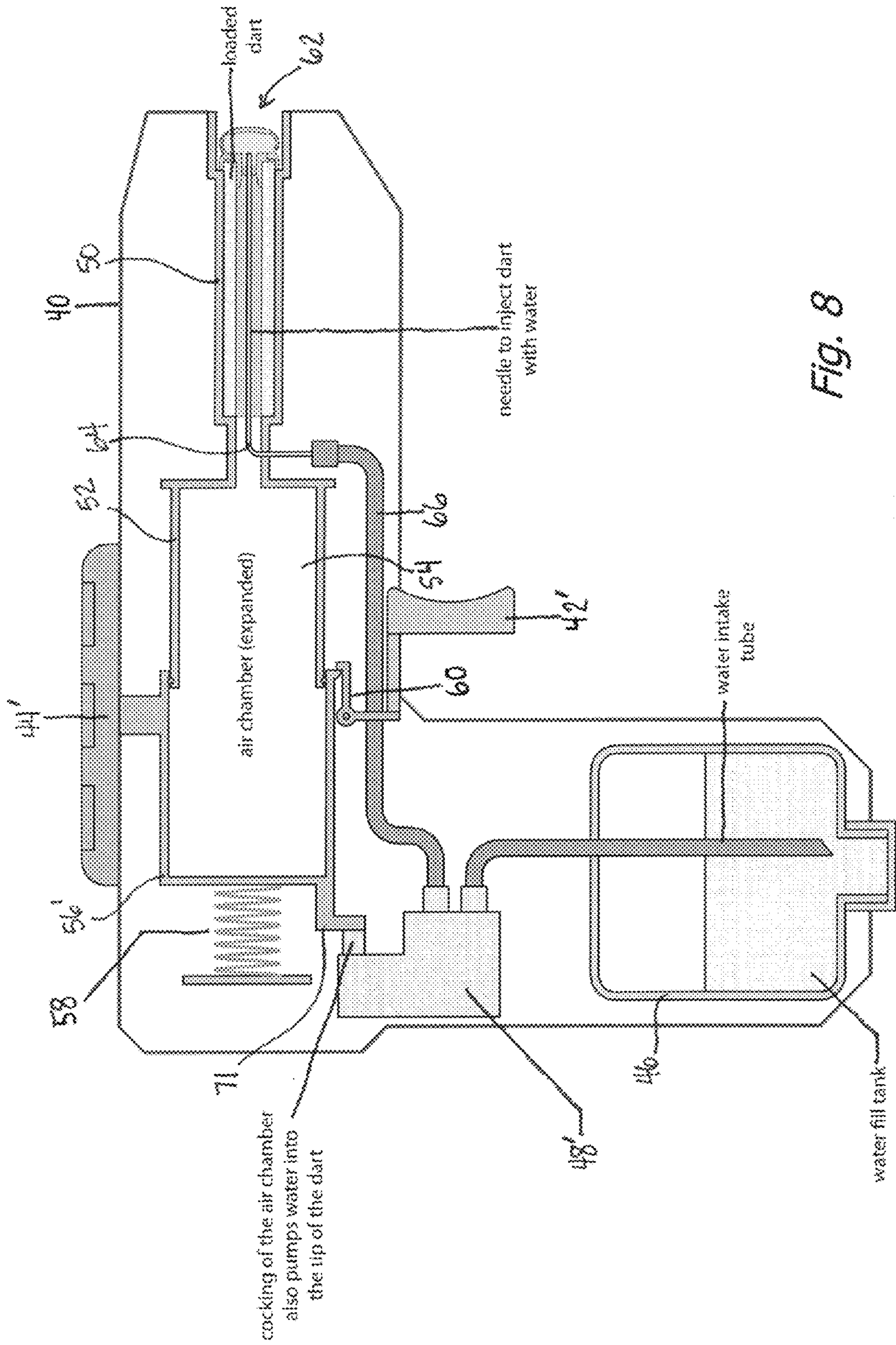


Fig. 8

MARKER TAG DARTS, DART GUNS THEREFOR, AND METHODS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a divisional of U.S. patent application Ser. No. 13/035,564 filed Feb. 25, 2011.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to the field of toy marker darts and water guns therefor.

2. Prior Art

Water guns and dart guns are well known in the prior art. See for instance U.S. Pat. Nos. 3,190,654, 3,330,561, 3,415,420, 3,528,662 4,257,188 4,743,030, 5,074,437, 5,241,944, 5,377,656, 5,381,928, 5,448,984, 5,626,343, 5,730,321, 5,826,879, 6,149,488, 6,203,397, 6,247,995, 7,185,787 and 7,267,118 and U.S. Patent Application Publication Nos. 2007/0012720, 2009/0064919, 2009/0127789 and 2009/0140493. However the present invention incorporates features not found in the prior art.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1*a* through 1*d* illustrate one embodiment of a marker tag dart in accordance with the present invention.

FIGS. 2*a* through 2*c* illustrate the marker tag dart of FIGS. 1*a* through 1*d* when the marker tag dart impacts an object.

FIGS. 3*a* through 3*c* illustrate an alternate embodiment of a marker tag dart.

FIG. 4 illustrates a toy gun for shooting the marker tag darts of the present invention in a cocked ready to shoot state.

FIG. 5 illustrates the toy gun of FIG. 4 when shooting a marker tag dart of the present invention.

FIG. 6 illustrates an exemplary target in the form of a vest type article worn by each player in a tag type game.

FIG. 7 illustrates an alternate embodiment of a toy gun for shooting the marker tag darts of the present invention.

FIG. 8 illustrates a further alternate embodiment of a toy gun for shooting the marker tag darts of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

First referring to FIGS. 1*a* through 1*d*, one embodiment of a marker tag dart in accordance with the present invention may be seen. FIG. 1*a* is a side view of this embodiment, with FIG. 1*b* being a cross section of the dart and FIG. 1*d* being a front view of the dart of FIG. 1*a* illustrating one technique for injection of water into the forward end of the dart. The main dart body 20 is a tubular flexible foam member, preferably a closed cell urethane foam or similar material. At the forward end of the dart is a flexible rubber cap 22, such as a molded silicon rubber cap, which mounts to the forward end of the body 20 with a rubber plug 24 therein. The flexible rubber cap 22 in this embodiment is somewhat thicker at the front than at the sides, and defines a chamber therein. A center plug 26, which may be a separate piece or integral with the rubber plug 24, has a central slit therein which will allow a needle, such as needle 28, to poke through the slit to inject a quantity of water 30 therein, as to be subsequently described. The center rubber plug 26 with slit 32 therein may be seen in FIG. 1*c*. By proper selection of the material for the center plug and design of the slit, the slit will easily open to receive needle 28, though will

be self closing on withdrawal of the needle to resist significant leakage of the water 30 back through the slit once needle 28 is withdrawn. The center plug 26 may have a duckbill type valve configuration which will be self sealing, particularly when the water 30 presses against the center plug 26 when the dart is propelled forward, also as shall be subsequently described.

Of particular importance to the dart of FIGS. 1*a* through 1*d* are slits 34 in the rubber cap 22. These slits pass all the way through the skin of the rubber cap, though normally stay sufficiently closed when the rubber cap 22 is in its free state to contain water 30 when injected therein. However, as shown in FIGS. 2*a* through 2*c*, when the dart impacts an object 36, the rubber cap 22 deflects opening slits 34, with the inertia of the water 30 causing the water to squirt out through the slits 34 as illustrated in these Figures.

The foam body 20 is very light, and together with the fact that the center of gravity of the marker tag dart is very far forward, assures that the dart will not tumble when propelled through the air. Instead, the axis of the dart will remain aligned with its direction of travel.

Now referring to FIGS. 3*a* through 3*c*, an alternate embodiment of a marker tag dart may be seen. This embodiment is nearly identical to the embodiment of FIGS. 1*a* through 1*d* and 2*a* through 2*c*, though instead of the rubber plug 24' having an integral or separate center plug, such as center plug 26 of the prior embodiment, the rubber plug 24' does not have a slit, but instead the forward end of the rubber cap 22' has a slit 38 so that a needle such as needle 28' may be used to inject water into the cavity within the rubber cap 22' from the forward end thereof. Otherwise the marker tag dart of FIGS. 3*a* through 3*c* functions the same way as the previously described embodiment.

Now referring to FIGS. 4 and 5, a toy gun for shooting the marker tag darts of the present invention may be seen. FIG. 4 illustrates the toy handgun with a marker tag dart loaded therein and cocked to shoot the marker tag dart, and FIG. 5 illustrates the actual shooting of the marker tag dart. These Figures are somewhat schematic, though well illustrate this embodiment. The gun in outward appearance has a handgun like body 40 with a trigger 42 and an air chamber cocking mechanism 44. Internally, in the handgrip region of the handgun is a water reservoir 46, a water pump 48 powered by trigger 42 and a barrel 50 with a connected portion 52 of an air chamber 54. The rear portion of the air chamber 54 is formed by a member 56 coupled to the air chamber cocking mechanism 44 and acting against coil spring 58. A latch 60 holds the member 56 of the air chamber 54 in a rearward position when the gun is cocked and ready to shoot, as shown in FIG. 4. When the marker tag dart 62 is loaded, needle 28 (see also FIG. 1*b*) will penetrate the slit 32 (FIG. 1*c*) as shown, with the needle 28 being coupled to the water pump 48 through water output tube 66.

When the trigger 42 is pulled and the trigger starts to move to the left as shown in FIGS. 4 and 5, water is first pumped by pump 42 from the water reservoir 46 through water output tube 66 and needle 28 into the nose of the marker tag dart 62. As the trigger continues to move, member 68 will engage latch 60 as shown in FIG. 5 and release the member 56 of the air chamber 54 to allow the coil spring 58 to push the member 56 of the air chamber forward as shown in FIG. 5, sending a blast of air into the barrel to launch the marker tag dart marker tag dart 62 as shown in FIG. 5.

In a typical use, a target may be used which changes color when wetted. In that regard, suitable hydrochromatic inks are readily commercially available. Alternative target may use a thin cloth with a second layer of a different color behind the

thin cloth, so that when wetted, the color of the second layer is visible through the wetted area of the thin cloth. The target might be a fixed target, or in a tag type target game, may be a vest type article worn by each player, one form of which is illustrated in FIG. 6. Alternatively, disappearing ink could be used instead of water so that no target is necessary.

Now referring to FIG. 7, an alternate embodiment of the marker tag gun may be seen. In this embodiment, the water output tube 66 does not go directly to needle 64 for loading the marker tag dart 62, but instead goes to a valve 69 which controls the flow of water in the water output tube 66. In particular, when in position 1 as shown, the water pumped by the initial pulling of the trigger is provided to the marker tag dart 62 through needle 64 prior to releasing the marker tag dart 62, as in the previously described embodiment. When valve 69 is in the second position, water flow is blocked so that the marker tag dart 62 will be released without having supplied water to its forward tip. In that regard, water pump 48 is a rather leaky pump, so that the trigger 42 can still be pulled even though water flow is blocked. When valve 69 is in the third position, water is supplied not to the tip of the marker tag 62, but rather through tube 70 to output nozzle 72 to shoot a stream of water starting just before the dart itself is released.

Now referring to FIG. 8, a further alternate embodiment is shown. This embodiment has a number of similarities to the prior embodiments. Accordingly, a number of parts may be identical to that of the earlier embodiments and are therefore given the same identification numerals. In some other cases, minor variations in the parts and/or their function have been made, and in such instances, such parts have been given the same identification numerals as the earlier embodiments, though followed by a prime to indicate some differences. By way of example, pump 48 in FIGS. 4, 5 and 7 is labeled pump 48' in the embodiment of FIG. 8 because of a minor variation thereof. The main difference in the embodiment of FIG. 8 is that pump 48' is actuated by a rear tab 71 on member 56'. In particular, pump 48' is actuated when the gun is cocked by pulling back on the cocking mechanism 44' until latch 60 engages the forward part of member 56' to hold the same in the cocked position against the force of spring 58. During this cocking motion, the rear tab 71 engages the water pump 48' to put water in the dart 62 through needle 64 and water output tube 66. Thus on pulling the trigger 42', the cocking mechanism is immediately released to fire the marker tag dart as before. The advantage of this embodiment is that the marker tag dart is preloaded with water so that no further water is ejected through needle 64 after the marker tag dart is launched, thereby avoiding any slight further water discharge of the earlier described embodiments because of some continued travel of the trigger pumping such additional water.

Thus the present invention has a number of aspects, which aspects may be practiced alone or in various combinations or sub-combinations, as desired. While certain preferred embodiments of the present invention have been disclosed and described herein for purposes of illustration and not for purposes of limitation, it will be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the invention as defined by the full breadth of the following claims.

What is claimed is:

1. A marker tag water gun comprising:

- an enclosure;
- a barrel attached to the enclosure, the barrel having a first inner diameter for receiving a marker tag dart;
- an air chamber in air communication with the barrel, the air chamber having a volume variable between first and second volumes, the first volume being larger than the second volume;
- a spring elastically forcing the air chamber to its second volume;
- a manually operable air chamber cocking mechanism coupled to the air chamber for manually moving the air chamber to the first volume against the force of the spring;
- a latch for releasably retaining the air chamber in its first volume;
- a water chamber for storing a supply of water;
- a water pump coupled to the water chamber, a water pump outlet being coupled to a needle for injecting water into a chamber in a marker tag dart; and
- a manually operable trigger disposed relative to the latch to release the latch during a motion of the trigger.

2. The marker tag water gun of claim 1 wherein the manually operable trigger is coupled to the water pump to pump water through the needle during a first motion of the trigger, before releasing the latch during a continuation of motion of the trigger.

3. The marker tag water gun of claim 1 wherein the air chamber cocking mechanism is coupled to the water pump to pump water through the needle during actuation of the air chamber cocking mechanism.

4. The marker tag water gun of claim 1 wherein the air chamber has a first member coupled to the enclosure and in air communication with the barrel, and a second member for sliding along the first member between first and second positions to define the first and second air chamber volumes.

5. The marker tag water gun of claim 4 wherein the first and second members have inner diameters that are larger than the inner diameter of the barrel.

6. The marker tag water gun of claim 1 wherein the marker tag water gun is in the shape of a toy hand gun, wherein the water chamber is in a hand grip of the toy hand gun.

7. The marker tag water gun of claim 1 further comprising a nozzle for squirting water as a squirt gun, and a manually operable control to control the functions of the marker tag water gun between the operations of:

- a) pumping water into a marker tag dart that was placed in the barrel and shooting the water tag dart without squirting water out of the nozzle,
- b) shooting a water tag dart that was placed in the barrel without pumping water into the marker tag dart or squirting water out of the nozzle, and
- c) squirting water out of the nozzle without pumping water into a marker tag dart that was placed in the barrel or shooting the water tag dart.